



Natural Yard & Garden

a guide to **ALTERNATIVES TO PESTICIDES**



THE CITY OF
VANCOUVER



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Introduction

What exactly is a pesticide? Pesticides include insecticides, herbicides and fungicides, which are designed to kill insects, weeds and diseases respectively. Using pesticides may be necessary at times, but in many cases there are alternatives that are often more effective in the long run and less harmful to the environment and the applicator.

While the environmental problems of the world may seem beyond your control, you can make a difference right in your own backyard. Begin by learning good gardening strategies, many of which will result in fewer pest problems. Then learn how to use less harmful methods for managing insect pests, weeds and diseases in your yard before reaching for chemical controls.

This guide introduces some gardening tips that reduce pest occurrence and includes a hierarchy of steps to take before using chemicals. Finally, it introduces some of the pests common to the Pacific Northwest. Since it is not a comprehensive resource, refer to the Resources section for sources of additional information.

Happy and healthy gardening!

Healthy Yard and Garden Strategies

Gardening can be a rewarding hobby or a frustrating chore. How you view it depends not only on the problems you encounter but on the strategies you use to tackle those problems. If you are just beginning, consider starting small. Gardening should be fun. The more you know about your garden, the better your choice of strategies will be, so read on!

Had Benjamin Franklin considered the subject, he would have agreed that an ounce of prevention is worth a pound of pesticides. There are many ways to prevent pest problems. Applying some or all of the following strategies will result in a healthier garden and help keep pest problems outside your garden gate.

Grow suitable plants

Native plants are the best choice for trouble-free gardening. Because they thrive naturally in our climate and soils, they do not need extraordinary cultural care to help them along. You should, however, still be aware that some can be hosts to imported pests such as root weevils and dogwood anthracnose.

Many plants that are infamous for pest problems, such as roses, cherries and rhododendron, have cousins or look-alikes that are less prone to pests. Look for resistant varieties when choosing plants, and ask nursery personnel for advice. This is especially important for plants that are prone to diseases since there are few control alternatives to fungicides.

Garden in raised beds

Raised-bed vegetable gardening is a great way to garden in Washington. Raised beds allow for closer plantings, more root development, exceptional drainage (which is especially nice for those with heavy clay soil) and earlier springtime plantings. Raised beds require minimal paths, which means less space is needed to grow a fixed amount of food and less room for weeds to take hold. All told, raised beds can reduce your use of fertilizer, compost, water, and, if used, pesticides.

Studies show that chromium, copper and arsenic all leach from treated wood. If you decide to make raised beds, consider using untreated wood, which you can treat yourself; cedar, locust or cypress wood, which are naturally rot-resistant; or plastic lumber, which is made from recycled milk jugs and other plastic.

Practice crop rotation and garden diversity

If you grow vegetables, rotate planting locations for each type of vegetable from year to year. This will help prevent diseases and nematodes from building up in the soil and causing damage. To be most effective, planting areas should be large enough to allow plenty of distance and time between vegetables from the same family. Ideally, the rotation should extend for three or four years.

Rotate vegetable plantings using the following listings as a guide. Do not plant two things from any of the following groups or families in the same place in consecutive seasons. If you will grow vegetables not included on these lists, rotate them each year as well.

- Legumes and pod crops: okra, all beans, all peas
- Alliums: all onions, leeks, garlic
- Brassicas: kale, cauliflower, cabbage, brussels sprouts, broccoli, kohlrabi, rutabagas, turnips, radishes, bok choy, oriental mustards, mizuna greens, others
- Solanaceous, root, and tuberous crops: any peppers, tomatoes, eggplant, potatoes, sweet potatoes, celery, beets, carrots, parsnips, others

Incorporating many types of plants into your landscape has numerous benefits. Diverse plantings provide food and cover for a variety of living things, including beneficial insects, that help your garden's ecosystem. Diversity also minimizes the impact a specific pest will have on the overall visual effect of your garden, since many attack only one species of plant.

Build healthy soil

Healthy soil contains many things – clay, silt and sand; air and water; and organic matter in various stages of decomposition. Organic matter is simply the stuff that at one time was part of a living plant or animal – leaves, bark, twigs, manure, dead insects and more. The real “magic” of soil is in fungi, bacteria and other microscopic life. These miracle workers break down organic matter into carbon, nitrogen and other elements, which are then taken up by plant roots and used again. The more organic matter in your soil, the “livelier” it will be. Fertilizers, whether synthetic or organic, can add these elements plants need, but organic fertilizers provide them over a longer period of time, more in keeping with the extended needs of the plants. It’s also easier to “overdose” with synthetic fertilizers, resulting in burned plants and fertilizer runoff into storm drains and eventually streams and rivers.

A traditional farmer’s adage is “to feed the plant, feed the soil.” To determine what type of soil you have, test the pH (the acidity or alkalinity) with a kit available at many plant stores. You can obtain more detailed information about soil tests from your local Washington State University Cooperative Extension Service office. A soil test is a good idea for anyone putting in a vegetable garden, and is strongly recommended for anyone planning to put in perennials such as berries or fruit trees. The test will tell you about your soil and what you can do to correct it for the crops you want to grow. Call your county extension office for more information.

Pay attention to your garden

One of the best things you can do for your garden is look at it! The English have a saying, “the best fertilizer is the owner’s footprints.” No matter how long you’ve been gardening, you are the expert in your own yard and will be the first to notice if something is amiss. If you inspect your plants regularly, perhaps every other day, you will learn what plants tend to dry out more frequently than others, which ones are prone to aphids, when root weevils begin to feed on the leaves in the summer, and many other interesting things. You may even see the beneficial insects at work! And most important, monitoring allows you to identify a pest occurrence before it becomes a problem. It’s much easier to deal with a small aphid colony than with 10 large aphid colonies. Monitoring is never having to say, “Where in the heck did that come from?”

Know a friend from a foe

To reduce pesticide use, learn what is and is not a pest. Many insects you'll find in your yard neither help nor harm plants, and many others are helpful predators or parasites. When you see a "crawly thing," figure out what it is before running for the bug spray. Even if you identify it as a plant eater, consider that the predators and parasites in your garden would probably like to eat it much more than you would like to spray it. Also ask yourself if this one pest will cause damage that will adversely affect the whole plant. If not, let it go and spend your time on more fruitful endeavors, such as producing an environment that will result in healthy plants and lots of places for predators to thrive.



Least-harmful Pest Control Strategies

If you use all the tactics mentioned previously, you may never see a pest problem, and if pests do occur, their impact will probably be limited. However, despite your best efforts, unwanted pests sometimes take hold in the garden. In those cases, take the following steps to tackle the problem with pesticides as your last option.

Identify the problem

Before considering what control measure to use, correctly identify the pest, disease or weed you are facing. Nursery personnel are a good resource, as are many books in garden stores and the library. WSU Cooperative Extension Master Gardeners or a county extension agent can be helpful. Keep in mind that most plant problems are not caused by insects or diseases at all, but are caused by inappropriate growing conditions. Furthermore, insects and diseases often attack plants that are already stressed from poor growing conditions.

Use appropriate controls

The choice of controls depends on the problem. Generally, options fall into the categories of hand removal, barriers, traps, biological control and least-toxic chemical control. Once you understand how each tactic works, you can make informed decisions on their best use.

Hand removal

Remember that every weed you pull and every insect you smash is one less to deal with later on. A sturdy blast of water can take out aphid populations, and pruning shears are all you need to control tent caterpillars. Removing diseased leaves, either by hand or rake, can help slow the spread of diseases. These leaves should not go to the compost pile, however, since diseases may not be destroyed in the composting process. However, diseased leaves can go into curbside yard debris containers for recycling.

Barriers

Barriers don't kill pests. They simply keep pests away from the places you don't want them. A good example is a screen door, which keeps flies out. Following are brief descriptions of common types of barriers:

Floating row covers: These are thin, lightweight fabrics or plastics that are placed over growing plants. They allow light, air and water to reach plants, but keep insects off. They are simply draped over the plants and secured on the sides with stones or soil. As plants grow, they push the fabric up.

Netting: Netting is good for keeping birds off plants, especially as they come into fruit.

Copper slug barrier: Slugs cannot cross a three-inch-wide sheet of copper. Sheet copper can be cut to size and attached to raised beds or planters, keeping slugs out. This method can also keep slugs in, so be sure to remove all slugs before banding. Apply banding vertically (like a fence) rather than horizontally (like a deck). It will continue to be effective after it has turned green. Despite the initial investment, this is an effective, inexpensive and long-lasting slug control tactic.

Sticky barrier: Marketed under the trade name Tanglefoot or Tangletrap, a sticky barrier will prevent insects and mites from walking up trunks of trees or shrubs. Note that root weevils walk, rather than fly, to the leaves of their hosts, so it can be used around the trunks of rhododendrons (as long as there are no branches touching the ground) to stop their movement. Apply the sticky material to a wide piece of tape that is first wrapped around the trunk.

Traps

All traps work by attracting a target pest into a container from which it cannot escape. Traps work best when there isn't much competition. For example, a slug might smell a slug trap in the middle of the garden, but it will also smell – and eat – many other tasty things along the way. Following are brief descriptions of common types of traps:

Sticky traps: These use a sticky barrier, such as Tanglefoot, with one or more attractants such as color, smell or shape, to bring the target pest in and keep it there. Yellow is a color commonly used since many insects associate yellow with flowers and, hence, plants.

Beer-filled slug trap These bring slugs out of the woodwork, so to speak. Just be sure to place them away from the garden and refill daily.

Biological controls

Some of your garden's best friends are natural enemies.

Biological controls, also called beneficials, are "the good guys" that are hard at work eating insects, slugs, mites and other creatures in your landscape. Some have very specialized tastes; others will eat just about anything smaller and slower than they are. These heroes of the garden are described in the section titled "Beneficial Insects and Others."

In all cases, beneficials will come to your landscape and set up housekeeping if you provide them with the following basics. Put your energy into attracting them naturally rather than purchasing them at a nursery and releasing them. If conditions aren't right to begin with, they'll move on anyway.

Water: This could be as small as a jar or bird bath or as large as a pond, just as long as it is available and filled with fresh water all year.

A place to live: Every animal needs a home to protect it from enemies and raise its young. Although you can't build little beneficial insect houses, you can grow them. Simply allow a variety of plants, including annual flowers, perennial flowers, bulbs, grasses, small shrubs, large shrubs, deciduous trees, and evergreen trees, to grow in your landscape. The beneficials will find their niches.

An alternate food source: Pollen and nectar, mainly produced by flowers, sustain insect predators and parasites when insect food is not available. Vertebrates, such as birds and squirrels, will enjoy fruits, grain, seeds and other things, especially during the winter when other foods are scarce. Once the beneficials get to know your landscape as a place to find food all year, they will keep coming back for the food you provide or the insects they pick off your plants.

Least-toxic chemical controls

Although using the practices mentioned previously will minimize, and possibly eliminate, the need for pesticides, there may be times when you choose to use them. In order to make informed decisions, it is important to understand them.

A few words about toxicity

All pesticides (synthetic and organic) are, by definition, toxic to some living thing – insecticides to insects, herbicides to weeds, fungicides to fungi, and so on. When a pesticide or any other material is described as “toxic,” it often makes people think of the effects the material has on human health. However, pesticides (and other chemicals) can also have toxic effects on the environment in which they are released.

There are many different ways to describe the toxicity of a material. For example, toxic effects on living organisms can be either acute (occurring immediately after the material is ingested or absorbed) or chronic (occurring after long-term exposure to the material). A substance may be short-lived (breaking down to harmless elements in a matter of hours or days) or persistent (remaining in their original state for months or years). Materials may bind readily to soil (making them more likely to remain in the site where they were applied) or may be very mobile (making them more likely to travel into surface or groundwater). Still others may be very soluble (dissolvable in water), volatile (likely to explode), or flammable (able to burn). In addition, some can cause secondary poisoning (direct or indirect effects on other living things that eat the original target).

Is “organic pesticide” an oxymoron?

How about “synthetic organic?”

Ask a chemist what “organic” means, and he or she is likely to say, “contains carbon.” All living things contain carbon, so organic matter is simply the stuff that at one time was part of a living plant or animal. Some fertilizers and pesticides can be produced from animal and plant parts, thus they can be called organic as well. The word “synthetic,” when referring to garden products, means “created by humans: not occurring in nature.” Synthetic pesticides are chemical compounds invented in a laboratory. Ironically, those synthetic compounds that contain carbon can, technically, be called “synthetic organic.”

Note that although the word organic, when it is used to describe the way foods are grown, has come to imply “pesticide-free,” a more accurate definition of the term in this case might be “grown without synthetic pesticides.” Note also that some pesticides are not derived from plants or animals yet are still considered safe to use, and they are allowed in organic food production. Examples include insecticidal soap, horticultural oil,

copper and sulfur. For more information about certified organic foods and food production, contact Oregon Tilth listed in the Resources section of this book.

The bottom line is this: no pesticide, synthetic or organic, is considered “safe.” But, because of the effects on other living things, some are safer to use than others. Before selecting a pesticide, become informed about all the effects it may have. When you use any pesticide, follow all these points:

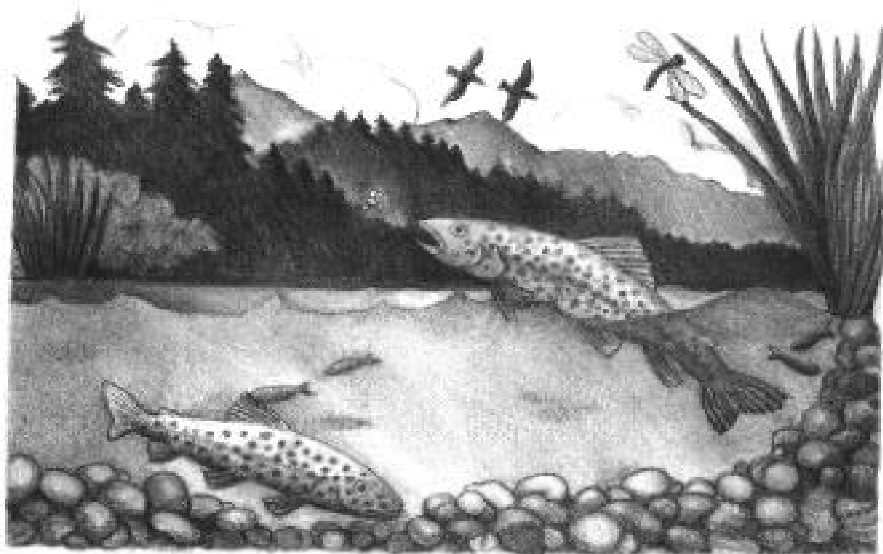
1. Read and follow all label directions. Never use more than is recommended.
2. Protect yourself. Wear a long-sleeved shirt, long pants, boots, rubber gloves, goggles, a hat and a respirator whenever mixing and applying pesticides of any kind.
3. Never apply anything on a windy or rainy day.
4. Only mix as much as you will use in one day.
5. Dispose of empty containers properly. When a product label says “triple rinse the container,” rinse it three times, pour the rinsate into the sprayer and apply it to the target area according to label instructions. Wrap empty and/or rinsed containers in newspaper and dispose of them in your trash can. Home-use pesticide containers are not recyclable.
6. Dispose of unwanted pesticides safely. Because pesticides are hazardous, they should never be disposed of in your garbage can or poured down the drain, into storm drains or onto the ground. Take them to a hazardous waste disposal facility or community collection event. In Clark County, call Environmental Services at 397-6118, ext. 4016 for more information.

Water Quality and Household Chemicals

Clark County residents get 97% of their drinking water from groundwater. Improper use or disposal of hazardous products can directly affect the water we drink and harm wildlife. Many of the pesticides and fertilizers used at home can cause water quality problems not only in our own backyards, but also miles away. Pesticides that pollute our region's streams and rivers, harm fish, aquatic plants and animals, swimmers and those who eat the fish they catch.

Water from rain or irrigation can carry pesticides and fertilizers from lawns and gardens into nearby street drains and into the groundwater. Many storm drains feed directly to neighborhood waterways. Once in the water, pesticides dissolve, dilute or combine with other chemicals to create harmful combinations that can kill fish and aquatic life, limit beneficial plant and animal populations, and increase growth of algae. Excess algal growth causes light deficiencies for plants and depletes oxygen levels that fish need to survive.

Clean water is an essential part of our quality of life. We can help protect our rivers, streams and lakes by rethinking and reducing our use of pesticides and other household chemicals.



Glossary

Bacillus thuringiensis (Bt)

a bacteria used to control certain pest larvae, primarily caterpillars. Bt is not toxic to humans or other mammals but will kill butterfly ("friendly") caterpillars as well as the problem ones. The bacteria kills larvae by interfering with digestion. Bt lasts on leaf surfaces five to seven days and must be ingested to be effective. There are many strains of Bt commercially available now, including strains for controlling mosquito and beetle larvae.

Boric acid

slow acting, low-toxicity, long-lasting (if kept dry) powder that is effective against ants, cockroaches and other structural pests. It is a digestive and contact poison and is usually applied as a dust. Products often come with a duster-type applicator. It is toxic if ingested, inhaled or comes into contact with abraded or broken skin. It poses a risk to children and pets if they come into contact with it. It is safe to place it in wall voids because it does not evaporate and cannot enter living spaces.

Diatomaceous earth

made from ground up fossils, it comes in a powder form and is very abrasive. It is a dust that abrades the skin and body joints of insects. Dry diatomaceous earth makes an effective slug barrier. Do not inhale the dust.

Dormant oils

act by coating the plant surface and suffocating any insects that are

present. Target pests are aphids, mites, scale insects, whiteflies and eggs of many pests, including some caterpillars. Dormant oils are meant for use on leafless, deciduous plants (especially fruit trees) in the winter to reduce pest populations before they hatch. If used in summer, these oils might defoliate the tree.

Horticultural oils

also called summer oils, these are more highly refined than dormant oils, making them appropriate for use on leaves during the growing season. Consult a nursery to locate a suitable product and follow all precautions. Don't use horticultural oils when plants are flowering.

Insecticidal soaps

highly refined liquid soaps (technically the potassium salt of fatty acids), sometimes combined with citrus oil. Soaps are normally mixed with water and sprayed onto leaves to control spider mites, aphids, scale insects, whiteflies and other soft-bodied insects. They are contact insecticides, meaning you must wet the pest for them to be effective. As always, follow package directions and cautions when using these products.

Neem

a relatively new botanical insecticide derived from a tree. This product is reported to be very effective, with slightly more staying power than some other botanical insecticides. It does, however, break down completely and is less toxic to humans than some botanicals.

Pheromone

a chemical substance produced by insects and animals that stimulates certain behavior of other members of the same species. Traps use female pheromones to attract males and prevent reproduction.

Pyrethrum

an effective, short-lived, naturally derived insecticide made from chrysanthemum flowers. It is toxic to all insects, including beneficial ones, and moderately toxic to birds and mammals. It should be the last resort for ornamentals and is not recommended on food crops. Avoid using formulations that contain piperonyl butoxide, which is currently being evaluated for its carcinogenicity. Pyrethrins are the individual chemicals found in pyrethrum. Pyrethroids are a new array of synthetic chemicals, such as cyfluthrin and cypermethrin. They resist breakdown, thus negating their major environmental advantage. With the three names being so similar, they can easily be confused. Pyrethrum is the least hazardous.

Rotenone

a tropical plant-derived insecticide that is harmful to insects, fish, birds and mammals. Read labels to see if the product is mixed with other pesticides. Check the label to see if the pest problem and the plant you want to protect are listed. It is toxic and should be handled with care. Follow label instructions exactly.

Ryania

a shrub native to South America is the source of this insecticide. It incapacitates fruit moths, corn borers, codling moths and imported cabbage worms.

As always, read the label before you buy to see what other ingredients may be mixed with it and if it is safe to use on your particular plants.

Sabadilla

the seeds of this South and Central American plant are ground into a powerful insecticidal dust. It is effective against grasshoppers, codling moth larva, webworm, aphid, cabbage looper, chinch bug and many household pests. It can irritate mucous membranes and cause sneezing. Honeybees are vulnerable to it. Handle it carefully.

Resources

Organizations

Clark County Environmental Services

(360) 397-6118, ext. 4352

Information about household and business hazardous waste, waste reduction, recycling, composting, and watershed resources

Vancouver Solid Waste

(360) 696-8186

Information about waste reduction, recycling, composting and other solid waste issues.

Washington Department of Ecology – Vancouver Field Office

(360) 690-7171

Information on business generated waste and water quality issues.

24 Hour Emergency Spill Response

(360) 407-6300

Cleanup of chemical and hazardous waste spills and leaks.

Hazardous Substance Information Office

1-800-633-7585

Information about the proper disposal of business generated hazardous products/waste.

Recycle Hotline

1-800-RECYCLE

Information about recycling non-toxic products and the disposal of household hazardous waste products.

WSU Cooperative Extension

(360) 254-8436

Northwest Coalition for Alternatives to Pesticides

PO Box 1393

Eugene, OR 97440

(541) 344-5044

www.efn.org/~ncap/

e-mail: info@pesticide.org

Washington Toxics Coalition

4649 Sunnyside Ave. N

Suite 540 East

Seattle, WA 98103

(206) 632-1545

www.accessone/~watoxics/

e-mail: Info@watoxics.org

Bio-Integral Resource Center

PO Box 7414

Berkeley, CA 94707

(510) 524-2567

www.social.com/health/nhic/data/hr1600/hr1694.html

Oregon Tilth

1860 Hawthorne NE, Suite 200

Salem, OR 97303

(503) 378-0690

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